



## CONTROL OF OPERATIONAL HYGIENE IN FAST FOOD RESTAURANTS

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### ABSTRACT

The aim of this study was control of operational hygiene in fast-food restaurants. Control was carried out in three fast food restaurants. Samples were collected from ten sampling places, in cycles of morning, afternoon and evening. Sanitation process was also controlled in each operation. Grown colonies of microorganisms were counted after incubation in a thermostat. Samples were collected using a 3M® plates Petrifilm™ - modern detection methods. Presence of coliform bacteria was determined by this method. In the first operation 1 sample from 30 sampling places did not meet the prescribed value according to standard. In the second operation 5 samples from 30 sampling places did not meet prescribed value according to the standard. In the third operation 2 samples from 30 sampling places did not meet the prescribed values.

**Keywords:** Plates 3M® Petrifilm™, operational hygiene, coliform bacteria, fast-food



## INTRODUCTION

"Fast Food" is the modern way of public catering. It is actually slang term for any food with limited nutritional value - they are foods rich in salt, sugar and fat, but is otherwise poor in other important substances, such as vitamins, minerals, fiber, and other useful substances (Hurley and Liebman, 2005).

Fast foods are frequently criticized for:

- low quality serving food,
- excessive use of artificial ingredients (emulsifiers, stabilizers, ...),
- low nutritional value, particularly in proteins (and conversely, excess sugars and fats),
- nutritionally unbalanced composition,
- absence of other important nutrients, trace elements,
- inhumane conditions for rearing animals for meat used in fast food restaurant
- inappropriate, unethical or misleading advertising,
- global increase in obesity and unhealthy eating habits (adults and children).

Many different factors may lead to foodborne infections and outbreaks; high risk factors for foodborne disease are food from unsafe sources, poor personal hygiene, inadequate cooking, improper holding times and temperatures, and cross contamination. Lack of knowledge concerning food safety among food handlers may result in the transmission of foodborne pathogens to the public during food preparation.

A recent meta-analysis has shown that food safety training increases knowledge and improves attitudes about hand hygiene practices and that refresher training and recurrent emphasis on good food handling behavior may have ongoing positive effects on hand washing practices among food handlers (Benevides and Lovatti, 2004). However other studies found that although special training may improve knowledge of food safety, this does not always result in better and safer food handling behavior (Buccheri et al., 2010).

Some authors pointed out that behavioral change and new food safety practices will only be implemented if adequate resources (e.g. structural environment, sufficient staff and time) and a supportive management culture exist (Toku et al., 2009). Apart from food safety training, several other factors and food handler

characteristics like age (Ryu et al., 2011), level of education and work experience may affect the knowledge scores (Mohan et al., 2006).

In 1993 the European Union issued a food hygiene directive (EU, 1993) establishing a general requirement for all food business to adopt a risk based food safety management system with the principles of the internationally accepted system hazard analysis critical control point (HACCP) recommended. However, each country in the EU interpreted the Directive into their national regulations in different ways - some requiring all the principles of HACCP others only some of them. This led to widely differing levels of interpretation. As a consequence members of the EU, as part of a wide consolidation of food safety legislation, negotiated legal requirements that could be applied to all businesses across the food industry. This Regulation, with no option for national amendment, came into force across Europe in January 2006 (EU, 2004). It requires all food businesses to implement a 'system based on HACCP principles'.

The catering industry is the largest sector of the food industry and accounts for approximately 60% of all food businesses. It comprises restaurants, cafes, take-aways, street vendors, hospitals, schools, prisons, residential homes, hotels and other premises where food is produced for immediate consumption. Many of these businesses are small (Airey, 2001), yet commonly operate a far more complex 'production' system, with large numbers of inputs, processes and outputs, than the typical food manufacturer.

Coliforms bacteria (CB) are a large group of gram-negative, non-spore-forming, rod-shaped bacteria that all belong to a single taxonomic family *Enterobacteriaceae*. The CB group refers to bacteria that are capable of aerobic and facultative anaerobic growth, ferment lactose at 37 °C within 48 h, possess the enzyme  $\beta$ -galactosidase and are oxidase-negative. They can be isolated from polluted and non-polluted waters, soils and plants, as well as from the faeces of humans and warm-blooded animals (mammals and birds). Hence, CB represents not only the intestinal (faecal in origin) bacteria but also other free-living (non-faecal in origin) coliforms, and therefore could be understood in a simplified way to represent "environmental bacteria" (Von Sperling, 2007).

The aim of this study was control of operational hygiene in fast-food restaurants. Control was carried out in three fast food restaurants.

## MATERIAL AND METHODS

The level of hygiene in fast-food restaurants using the fingerprint method was evaluated. Fingerprint method using a 3M® Petrifilm™ plates was used for the detection of coliform bacteria. There were taken 90 samples. Detection method

using a Petrifilm plates is accepted by AOAC and validated by AFNOR. Method of petrifilm plates, as detection of microbial contamination, consists of four steps:

1. Hydration of Petrifilm plates by 1 ml of buffered water,
2. Sampling by fingertint method,
3. Incubation at 37 ° C for 24 hours,
4. Counting-grown colonies.

Evaluation is carried out according to the following limit values:

- 0-1 KTJ.cm<sup>-2</sup> – meets requirements (20 KTJ.cm<sup>-2</sup> on whole Petrifilm plate),
- >1 KTJ.cm<sup>-2</sup> – doesn't meet the requirements.

Sampling points in each operation:

- table for preparation,
- knife,
- board for meat,
- wall next to the work desk,
- microwave,
- grill,
- combi steamer,
- dough mixer,
- furnace,
- ladle.

## RESULTS AND DISCUSSION

In the first traffic 1 sample (table for meat after morning sampling) from 30 sampling places did not meet the prescribed value according to standard (Figure 1).

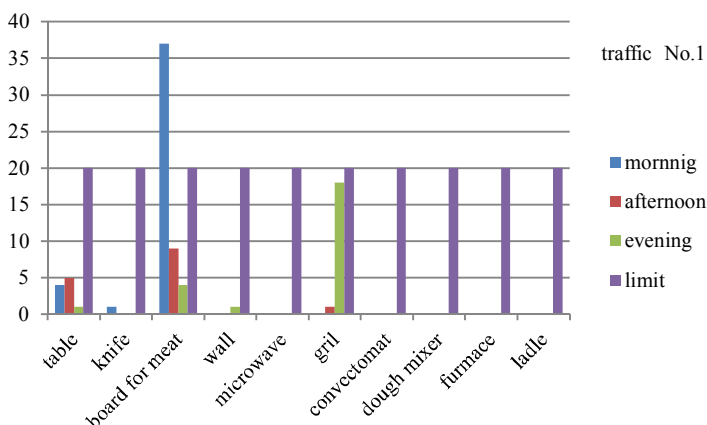


Figure 1 Number of coliform bacteria in traffic 1

In the second traffic 5 samples (knife afternoon and evening and table for meat from all three sampling) from 30 sampling places did not meet prescribed value according to the standard (Figure 2).

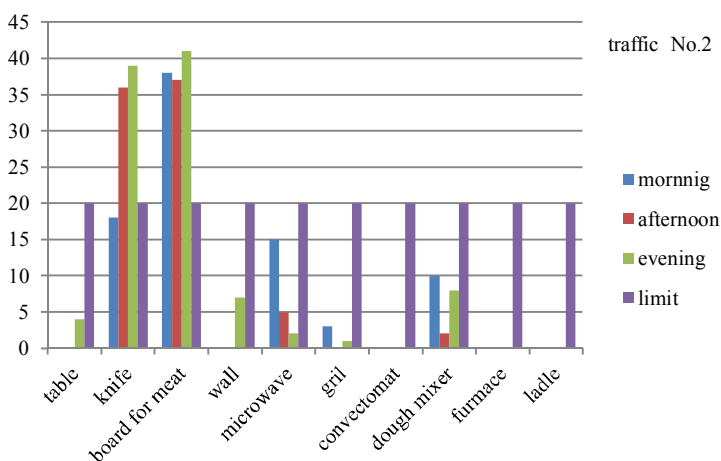


Figure 2 Number of coliform bacteria in traffic 2

In the third traffic 2 samples (Table for meat in the evening, grill after midday sampling) from 30 sampling places did not meet the prescribed values (Figure 3).

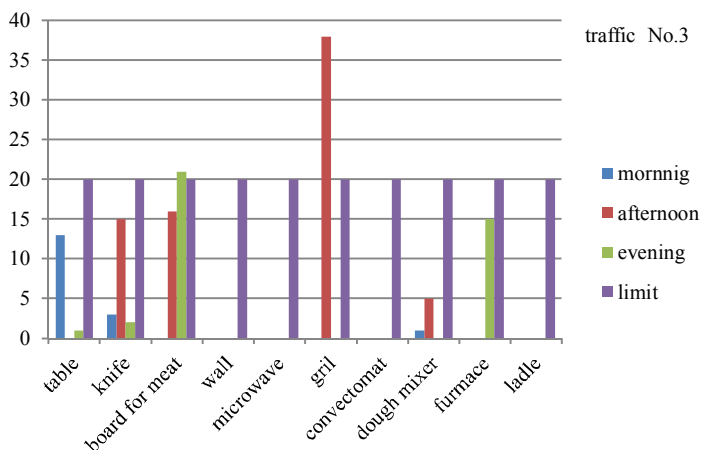


Figure 3 Number of coliform bacteria in traffic 3

Food-borne diseases represent a widespread and growing public health problem, both in developed and developing countries (WHO, 2007). According to the WHO (WHO, 2007), this problem has a large impact on the health and economy in developing countries, with 1.8 million people dying from diarrheal diseases globally in 2005 alone. As a developing country, it was reported in China in 2009 that 11,007 people suffered from food poisoning, including 181 deaths (MOHC, 2010). Since notification is not obligatory, data on food-borne infections and intoxications do not reflect the actual reality of the situation in the country (WHO, 2004). Food safety remains a critical issue with outbreaks of food-borne illness resulting in substantial costs to individuals, the food industry, community health systems, and to the economy in general (Egan et al., 2007).

Legnani et al. (2004) performed the microbial monitoring in catering establishment. The most critical surfaces were those used for the preparation of the food (tables, boards): 22.2% had a total plate count at 32 °C above 10,000 cfu/cm<sup>2</sup> and 16.7% were contaminated by *E. coli* at a level above the limit of 1 cfu/cm<sup>2</sup>. An unacceptable contamination with *E. coli* (7.8% of samples) was also seen in the non-cutting equipment. The cutting blades and the inner surfaces of the containers were more compliant with the advisory standards, aided by the use of hot water dishwashers that help to clean and decontaminate the equipment. The indicator *S. aureus* does not appear to play a particularly important role in the contamination of the surfaces, since it was isolated from the non-cutting tools in only 2% of samples. As far as the potential pathogens are concerned, *L. monocytogenes* was isolated once from the blade of a knife.

Bajžík et al. (2009) carried out 100 samples by Petrifilm plates in two public catering establishment during one calendar year. They examined the number of *Enterobacteriaceae* bacteria. Samples which did not meet the requirements were:

- table for meat – 3x,
- knife for meat – 2x,
- grill – 2x,
- table for preparation – 1x,
- bar – 1x,
- worker's hand – 2x.

## CONCLUSION

Petrifilm plates were used for the control of operational hygiene in fast food restaurants. There were evaluated 90 samples. Unacceptable contamination was found in 8 sampling places in traffics. It is important to work under strict aseptic conditions in the production of food. Increased levels of micro-organisms are the result of poor sanitation.

## REFERENCES

- AIREY, S. 2001. In *Proceedings of the 1st National Conference. HACCP for Catering: preparing for 2006*, Lowry Centre, Salford Keys, November 30th 2004.
- BAJŽÍK, P. – BOBKOVÁ, A. – BOŠIAK, M. – ONDREJKA, M. – BELEJ, L. 2009. Hodnotenie hygienického stavu prevádzky a preverenie odbornej spôsobilosti zamestnancov. In *Stretnutie mladých vedeckých pracovníkov v potravinárstve : II. vedecká konferencia, zborník abstraktov, Nitra 3. - 4. december 2009*. Bratislava: Ministerstvo pôdohospodárstva SR, 2009, ISBN 978-80-552-0317-1.
- BENEVIDES, C.M.J. – LOVATTI, R.C.C. 2004. Segurança alimentar em estabelecimentos processadores de alimentos. In *Higiene Alimentar*, vol. 18, 2004, no.125, p. 24–27.

- BUCCHERI, C. - MAMMINA, C. - GIAMMANCO, S. - GIAMMANCO, M. - GUARDIA, M.L. - CASUCCIO, A. 2010. Knowledge, attitudes and self-reported practices of food service staff in nursing homes and long-term care facilities. In *Food Control*, vol. 21, 2010, no. 10, p. 1367–1373.
- EGAN, M.B. - RAATS, M.M. - GRUBB, S.M. - EVES, A. - LUMBERS, M.L. - DEAN, M.S. *et al.* 2007. A review of food safety and food hygiene training studies in the commercial sector. In *Food Control*, vol. 18, 2007, no. 10, p. 1180–1190.
- EUROPEAN UNION. 1993. Council Directive 43/93 of 14.6.1993 on the hygiene of foodstuffs. In *Official Journal of the European Communities*, L 175, Brussels.
- EUROPEAN UNION. 2004. Council Regulation 852/2004 of 29.4.04 on the hygiene of foodstuffs. In *Official Journal of the European Communities*, L 139, Brussels.
- HURLEY, J.- LIEBMAN, B. 2005. Fast Food. Nutrition Action Healthletter, 2005. ISSN: 0002-9165.
- LEGNANI, P. - LEONI, E. - BRUNOZZI, A. 2004. Rischi alimentari nella ristorazione collettiva: aspetti epidemiologici ed indirizzi di prevenzione in Emilia-Romagna. In *Igiene Moderna*, vol. 108, 1997, p. 49–65.
- MOHAN, U. - MOHAN, V. - RAJ, K. 2006; A Study of Carrier State of S. Typhi, Intestinal Parasites & Personal Hygiene amongst Food Handlers in Amritsar City. In *Indian Journal of Community Medicine*, vol 2, 2006, p. 31.
- MOHC. 2010. The notice of food poisoning events in 2009 in China.
- PICHLER, J. - ZIEGLER, J. - ALDRIAN, U. - ALLERBERGER, F. 2014. Evaluating levels of knowledge on food safety among food handlers from restaurants and various catering businesses in Vienna, Austria 2011/2012. In *Food Control*, vol. 32, 2014, no. 1, p. 33-40.
- RYU, J-H. - KO, J. - PARK, H. - YANG, S. - KIM, H. 2011. Microbial Examination of Nonheated Foods Served in Feeding Programs of Elementary Schools, Iksan City, Jeonbuk Province, Korea. In *Journal of Food Protection*, vol. 74, 2011, no. 9, p. 1564–1568.
- TOKU, B. - EKUKLU, G. - BERBEROGLU, U. - BILGE, E. - DEDELER, H. 2009. Knowledge, attitudes and self-reported practices of food service staff regarding food hygiene in Edirne, Turkey. In *Food Control*, vol. 20, 2009, no. 6, p. 565–568.
- VON SPERLING, M. 2007. Wastewater Characteristics, Treatment and Disposal. In *Biological Wastewater Treatment*, vol. 1, 2007.
- WHO. 2004. Surveillance program for control of foodborne infections and toxications in Europe 8th report 1999–2000. Country reports. Turkey.
- WHO. 2007. Food safety and food-borne illness. F. s. N. 237.